Letter to the Editor

Tricuspid L and L' waves

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Conflict of interest

None.

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A 28-year-old man presented with progressive systemic edema and general fatigue. Ventricular septal defect and pulmonary atresia had been treated by the Rastelli operation when he was 4 years old. Chest X-rays showed that he was free of cardiomegaly and pulmonary congestion (Fig. 1A). Electrocardiography showed a normal sinus rhythm and a non-specific ventricular conduction disturbance, with a heart rate of 74 beats/min (Fig. 1B). Echocardiography revealed normal left ventricular systolic function and right ventricular hypertrophy (Fig. 1C). Right ventricular systolic pressure was elevated with a tricuspid regurgitation pressure gradient of 48 mmHg. The inferior vena cava dimension was 24 mm without respiratory change. The findings of trans-mitral pulsed-wave and tissue Doppler ultrasound at the lateral mitral annulus were normal (Fig. 2A and B). Trans-tricuspid pulsed-wave Doppler ultrasound revealed triphasic motion with an L wave (Fig. 2C, arrow). An E/A ratio of 1.8 and a deceleration time of 175 ms were normal [1]. Tricuspid annular motion included an L' wave (Fig. 2D, arrow) in mid-diastole, in addition to E' and A' waves. The tricuspid E/E' ratio was 11.2, indicating right ventricular diastolic dysfunction [1]. The mitral L and L' wave is reportedly an important marker of severe diastolic dysfunction [2,3]. An L wave in pulse wave Doppler represents continued pulmonary vein mid-diastolic flow through the left atrium in to the LV across mitral valve after early rapid filling. An L' wave in such

patients associated with a higher E/E' indicates advance diastolic dysfunction [3]. This has been attributed to a combination of elevated filling pressure, delayed myocardial relaxation, increased preload and a slow heart rate [4]. Although established, its clinical significance is poorly understood. As the abnormally relaxing left ventricle is unable to generate pronounced suction during early diastole, two mechanisms occurring in tandem might facilitate diastatic flow: delayed active left ventricular relaxation and elevated left atrial pressure [4,5]. To our knowledge, this is the first clinical case report regarding a tricuspid L wave. Right ventricular hypertrophy is a common sequela of postoperative congenital heart disease and it is often associated with abnormal diastolic function [6]. Identifying patients with right ventricular hypertrophy and increased filling pressure is potentially important as they have a greater risk of developing heart failure [6]. The results of observational studies indicate that diastolic heart failure accounts for an estimated half of all types of heart failure, and it is recognized as a clinical entity that causes significant morbidity and mortality [7]. Although diastolic dysfunction can be identified using newer techniques such as strain-rate imaging and three-dimensional echocardiography [8], these modalities have not gained widespread applicability. By contrast, the L and L' waves are easily recognized during routine echocardiography without the need for additional data

acquisition or processing. The tricuspid L and L' wave appears to be a marker of right ventricular diastolic dysfunction and heart failure.

The present findings indicate that tricuspid L and L' waves could serve as a novel promising marker of right ventricular diastolic dysfunction and increased filling pressure.

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Figure legends

Figure 1. Chest X-ray (A), electrocardiography (B), and echocardiography (C) findings. Left and right ventricular systolic functions are normal. Right ventricular hypertrophy is remarkable.

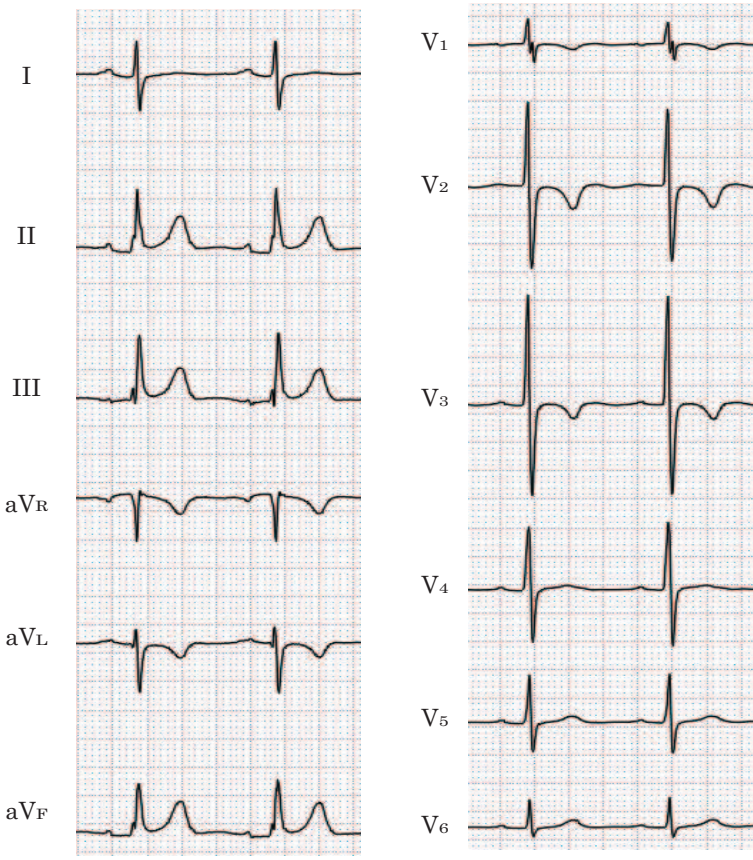
Figure 2. Trans-tricuspid pulsed-wave Doppler ultrasound findings.

Trans-mitral inflow (A) and mitral annulus velocity (B) are normal. Triphasic motion with L wave is evident (C, arrow). Tissue Doppler-derived tricuspid annular motion includes an L' wave (D, arrow).

Figure 1

A

B


I
II
III
aVR
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C

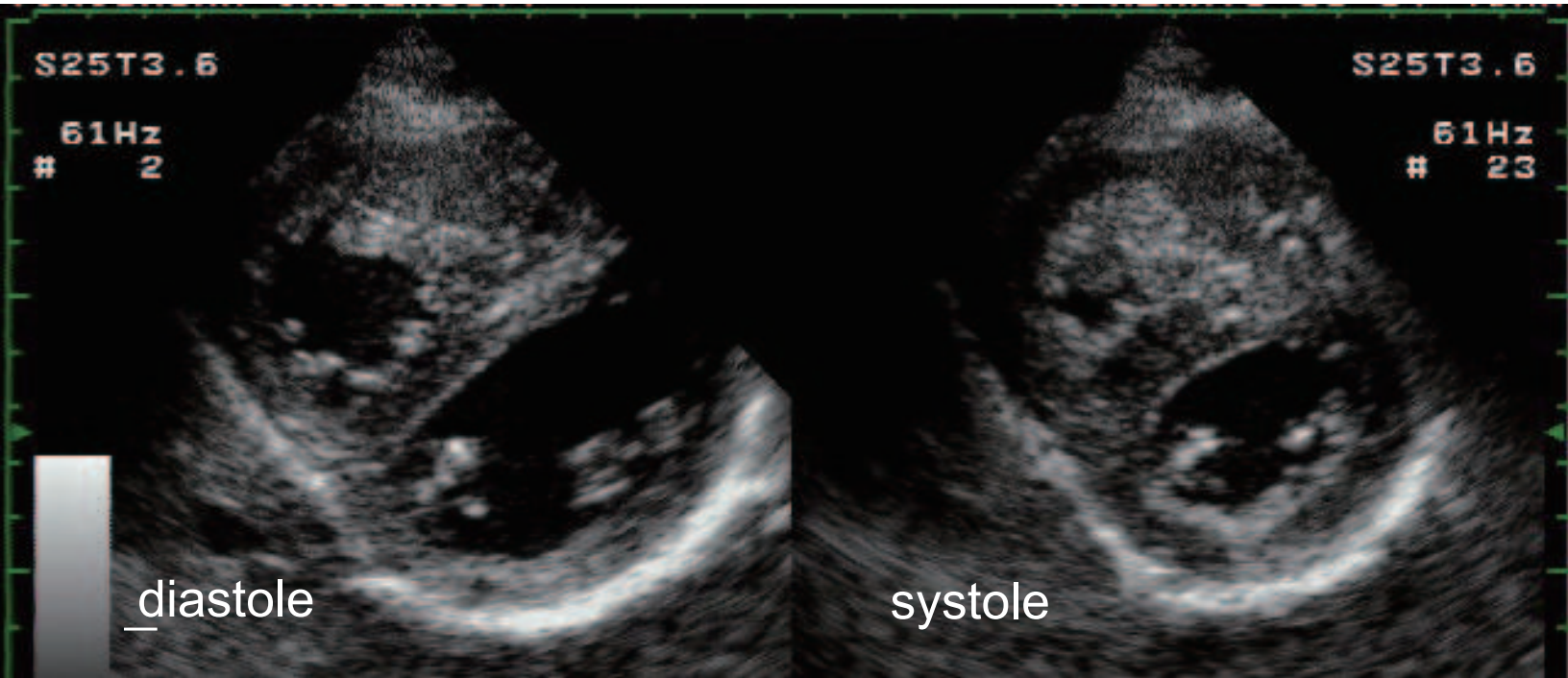
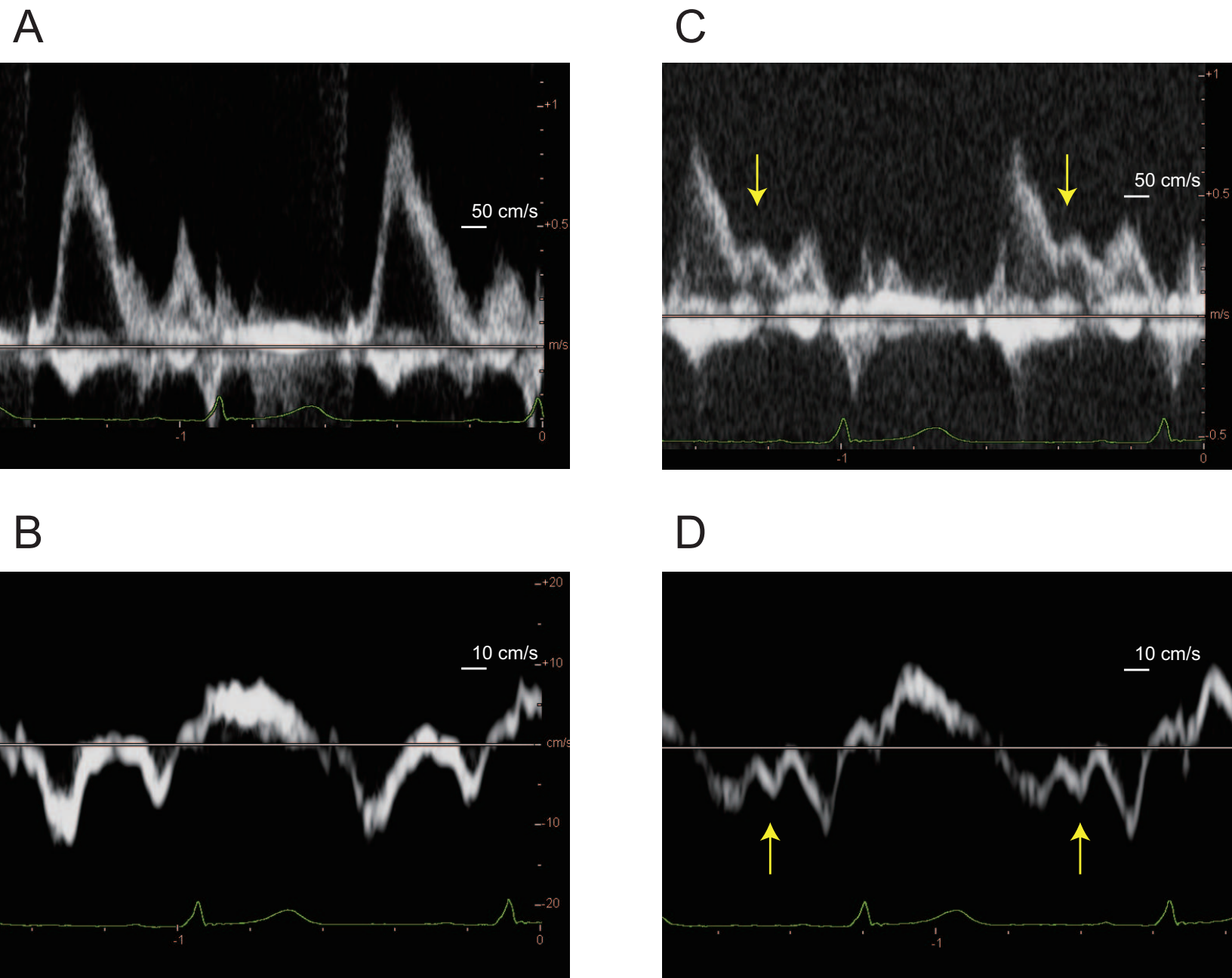

S25T3.6
61Hz
2
diastole
S25T3.6
61Hz
23
systole

Figure 2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50 cm/s
+0.5
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C
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